27. (Added) The method of claim 21, wherein the substrate under said substantially continuous dielectric layer comprises isolation regions, and wherein the isolation regions comprise undoped SiO_2.

REMARKS

Claim 6 has been canceled. Claims 1, 5, 7, 11-13, 17, and 19-20 have been amended. Claims 22-27 have been added. Thus, claims 1-5 and 7-27 are currently pending in the case. Further examination and reconsideration of the presently claimed application is respectfully requested.

Section 112, 2nd Paragraph, Rejections:

Claims 1-16 and 18 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 1, 5, and 11-13 have been amended. These amendments are believed to clarify the claim language in a manner that addresses the concerns about those claims expressed in the Office Action.

The rejections of claims 12, 13, and 18, however, appear to have no basis. For example, the Office Action states that "[a] patent weight of the claimed selectivity value could not be given unless limitation of 'silicon nitride' is positively cited in the claim as part of a process step." (Office Action -- pp. 2-3.) As recited in claims 12, 13, and 18, selectivity is a property of an etch chemistry and is the limitation of these claims (i.e., the selectivity limits the etch chemistry recited in the independent claims from which these claims depend). Therefore, in claim 12, for example, silicon nitride does not have to be positively cited in the claim as a part of a process step. Accordingly, removal of the §112, second paragraph, rejections of claims 1-16 and 18 is respectively requested.

Section 102 Rejections:

Claims 1-5, 8, 10-13, 15, and 17-18 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,783,496 to Flanner et al. (hereinafter "Flanner"). Claims 1-5, 8, 10-13, 15, and 17-18 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,728,619 to Tsai et al. (hereinafter "Tsai"). Claims 1-2, 4, 6-8, 10-13, and 15-16 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,274,481 to Yang et al. (hereinafter "Yang"). Claims 1-5 and 8-13 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,562,801 to Nulty (hereinafter "Nulty"). Claims 1-8, 11-14, 15-19, and 20 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,258,729 to DeBoer et al. (hereinafter "DeBoer"). Claims 1-6, 8, 11-13, 15, and 17-18 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,074,959 to Wang et al. (hereinafter "Wang"). Claims 1-5, 8, 11-13, 15-18, and 20 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,025,255 to Chen et al. (hereinafter "Chen"). As will be set forth in more detail below, the § 102 rejections of claims 1-8 and 10-20 are respectfully traversed.

The standard for "anticipation" is one of fairly strict identity. A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Bros. V. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987), MPEP § 2131. The cited art does not disclose all limitations of the currently pending claims, some distinctive limitations of which are set forth in more detail below.

The cited art does not disclose etching a first portion of a dielectric layer with a first etch chemistry that is substantially free of hydrogen and includes C_4F_8. Amended independent claim 1 recites in part: "[a] method for forming a semiconductor device, comprising: etching a first portion of a dielectric layer formed on a semiconductor topography with a first etch chemistry, wherein the first etch chemistry is substantially free of hydrogen and comprises C_4F_8." Support for the amendments to the claim may be found, for example, in claims 6 and 7 as originally filed.

Flanner discloses a method in a plasma processing chamber for fabrication a semiconductor device having a self-aligned contact. Flanner, however, does not disclose etching a first portion of a dielectric layer with a first etch chemistry that is substantially free of hydrogen and includes C_4F_8. For example, Flanner states that "[t]he aforementioned method includes a first etching step for etching partially through the oxide layer of the layer stack with a first chemistry and a first set of process parameters. The first chemistry comprises essentially of CHF_3 and C_2HF_5." (Flanner -- col. 2, lines 45-49.) In addition, there is no teaching or suggestion within Flanner to etch a first portion of a dielectric layer with a first etch chemistry that is substantially free of hydrogen and includes C_4F_8. Therefore, Flanner does not teach or suggest etching a first portion of a dielectric layer with a first etch chemistry that is substantially free of hydrogen and includes C_4F_8, as recited in claim 1. As such, Flanner does not teach or suggest all limitations of claim 1.

Tsai discloses a method for forming within an integrated circuit a narrow line-width high aspect ratio via. Tsai, however, does not disclose etching a first portion of a dielectric layer with a first etch chemistry that is substantially free of hydrogen and includes C_4F_8. For example, Tsai states that "the Reactive Ion Etch (RIE) first etch method through which may be formed partial vias of substantially parallel sidewalls within the preferred blanket planarized Pre-Metal Dielectric (PMD) layer 24 of silicon oxide is formed of a reactant gas mixture comprising tri-fluoro methane (CHF3), carbon tetra-fluoride (CF4) and argon (Ar)." (Tsai -- col. 10, lines 3-9.) Furthermore, there is no teaching or suggestion within Tsai to etch a first portion of a dielectric layer with a first etch chemistry that is substantially free of hydrogen and includes C_4F_8. Therefore, Tsai does not teach or suggest etching a first portion of a dielectric layer with a first etch chemistry that is substantially free of hydrogen and includes C_4F_8, as recited in claim 1. As such, Tsai does not teach or suggest all limitations of claim 1.

Yang discloses etching sidewall nitride to leave a thin layer of nitride covering the silicon in a DRAM array. Yang, however, does not disclose etching a first portion of a dielectric layer with a first etch chemistry that is substantially free of hydrogen and includes C_4F_8. For example, Yang states that "the etch is shortened to leave approximately 10-30 nm of nitride on the surface of the wafer (step 230), as shown in FIG. 2B, where the layer of nitride 50' has been thinned, but not removed. A typical recipe for this etch step is as follows: Source Flow: 15 sccm

of CHF3; Source Flow: 5 sccm of O2; Inert Flow: 75 sccm of Ar." (Yang -- col. 2, lines 46-54.) This etch removes a portion of the nitride before deposition of a different dielectric layer. Yang further states that the etch is "followed by deposition (step 260) of the dielectric 60, seen in FIG. 2D...A typical recipe for the dielectric etch is as follows: Source Flow: 14 sccm of C4F8; Source Flow: 240 sccm of CO; Inert Flow: 320 sccm of Ar." (Yang -- col. 2, line 66 - col. 3, line 6.) In addition, Yang states that "[a]t the completion of the dielectric contact etch, only the thinned layer of nitride 50' and the gate dielectric 30 cover the silicon." (Yang -- col. 3, lines 11-13.) Therefore, Yang teaches etching an entire dielectric layer with the recipe for the dielectric etch. However, there is no teaching or suggestion within Yang to etch a first portion of a dielectric layer with a first etch chemistry that is substantially free of hydrogen and includes C_4F_8. As such, Yang does not teach or suggest etching a first portion of a dielectric layer with a first etch chemistry that is substantially free of hydrogen and includes C_4F_8, as recited in claim 1. Consequently, Yang does not teach or suggest all limitations of claim 1.

Nulty discloses a method of etching an oxide layer. Nulty, however, does not disclose etching a first portion of a dielectric layer with a first etch chemistry that is substantially free of hydrogen and includes C_4F_8. For example, Nulty states that "the etch is performed in a flow comprising approximately 1.5 SCCM Freon 134a and approximately 47 SCCM CHF_3." (Nulty -- col. 9, lines 18-20.) Nulty also states that "[i]n the present invention it has been found that by the addition of Freon 134a to any etch chemistry, improved oxide:nitride selectivity is achieved, even in chemistries that do not otherwise exhibit oxide:nitride selectivity. Freon 134a has the formula $C_2H_2F_4$." (Nulty -- col. 9, lines 48-52.) In addition, there is no teaching or suggestion within Nulty to etch a first portion of a dielectric layer with a first etch chemistry that is substantially free of hydrogen and includes C_4F_8. As such, Nulty does not teach or suggest etching a first portion of a dielectric layer with a first etch chemistry that is substantially free of hydrogen and includes C_4F_8, as recited in claim 1. Consequently, Nulty does not teach or suggest all limitations of claim 1.

DeBoer discloses an oxide etching method and resulting structures. DeBoer, however, does not disclose etching a first portion of a dielectric layer with a first etch chemistry that is substantially free of hydrogen and includes C_4F_8. For example, DeBoer states that "the plasma used for the dry etch 20 is generated using one or more fluorocarbon or hydrofluorocarbon

gases such as CHF_3, C_2HF_5, CH_2F_2, CF_4, C_2F_6, C_3F_8, or any other carbon and fluorine containing gases alone or in combination with other gases such as those used for dilution." (DeBoer -- col. 10, lines 33-37.) DeBoer also states that "any fluorocarbon or hydrofluorocarbon feed gases for use in generating $C_xH_yF_z^+$ ions or $C_xF_z^+$ ions may be utilized in accordance with the present invention." (DeBoer -- col. 10, lines 42-45.) DeBoer, however, does not disclose criteria for selecting a compound from those listed above. In addition, DeBoer states:

> . . . conditions for an etcher such as high density plasma etcher to perform such dry etch processing using fluorocarbon or hydrofluorocarbon components preferably includes . . . C_2HF_5 at a flow rate of about 5sccm to about 50 sccm, CHF_3 at a flow rate of about 5 sccm to about 50 sccm, and CH_2F_2 at a flow rate of about 5 sccm to about 50 sccm. (DeBoer -- col. 10, line 63 - col. 11, line 10.)

However, there is no teaching or suggestion within DeBoer to etch a first portion of a dielectric layer with a first etch chemistry that is substantially free of hydrogen and includes C_4F_8. As such, DeBoer does not teach or suggest etching a first portion of a dielectric layer with a first etch chemistry that is substantially free of hydrogen and includes C_4F_8, as recited in claim 1. Consequently, DeBoer does not teach or suggest all limitations of claim 1.

Wang discloses a plasma etch process applicable to a self-aligned contact hole. Wang, however, does not disclose etching a first portion of a dielectric layer with a first etch chemistry that is substantially free of hydrogen and includes not in claim 17 C_4F_8. For example, Wang states that "[i]n the first step, C_3F_8 was used as a hydrogen-free fluorocarbon for a 100 second etch." (Wang -- col. 9, lines 27-29.) Wang also states that "the principal etching gases hexafluoropropylene, octofluoropropane, heptafluoropropane, and hexafluoropropane provide effective oxide etching, particularly in a low-pressure, high density plasma." (Wang -- col. 10, lines 30-34.) Wang further states that "[t]he control according to the invention is achieved by the use of one or more of hydrofluoropropanes, particularly $C_3H_2F_6$ and closely related hydrofluorocarbons." (Wang -- col. 10, lines 42-45.) However, there is no teaching or suggestion within Wang to etch a first portion of a dielectric layer with a first etch chemistry that is substantially free of hydrogen and includes C_4F_8. As such, Wang does not teach or suggest etching a first portion of a dielectric layer with a first etch chemistry that is substantially free of hydrogen and includes C_4F_8, as recited in claim 1. Consequently, Wang does not teach or suggest all limitations of claim 1.

Chen discloses a two step etching process for forming self-aligned contact. Chen, however, does not disclose etching a first portion of a dielectric layer with a first etch chemistry that is substantially free of hydrogen and includes C_4F_8. For example, Chen describes a first etch process that uses "[a]n etchant gas mixture containing fluorocyclobutane (C_4F_8) at between about 10 and 15 SCCM and CH_3F at between about 8 and 15 SCCM." (Chen -- col. 5, lines 49-51.) However, there is no teaching or suggestion within Chen to etch a first portion of a dielectric layer with a first etch chemistry that is substantially free of hydrogen and includes C_4F_8. As such, Chen does not teach or suggest etching a first portion of a dielectric layer with a first etch chemistry that is substantially free of hydrogen and includes C_4F_8, as recited in claim 1. Consequently, Chen does not teach or suggest all limitations of claim 1.

The cited art does not disclose etching a first portion of a dielectric layer with a first etch chemistry that is substantially free of hydrogen and etching a second portion of the dielectric layer which has a thickness greater than about one half a height of gate structures. Amended independent claim 17 recites in part:

> A method for forming a contact hole, comprising . . . etching a first portion of the dielectric layer with a first etch chemistry, wherein the first etch chemistry is substantially free of hydrogen; and etching a second portion of the dielectric layer with a second etch chemistry, wherein a thickness of the second portion of the dielectric layer is greater than approximately one half a height of the first and second gate structures.

Support for the amendments to the claim may be found in the Specification, for example, in page 10, line 20 - page 11, line 20.

For at least the reasons set forth above, Flanner, Tsai, Yang, Nulty, DeBoer, Wang, and Chen do not teach or suggest etching a first portion of a dielectric layer with a first etch chemistry that is substantially free of hydrogen. In addition, there is no teaching or suggestion within the cited art to etch a first portion of a dielectric layer with a first etch chemistry that is substantially free of hydrogen and etching a second portion of the dielectric layer which has a thickness greater than about one half a height of gate structures, as recited in claim 17. For example, Yang teaches etching a dielectric layer in a nitride layer in multiple etch steps. Yang, however, states that "the etch is shortened to leave approximately 10-30 nm of nitride on the surface of the wafer." (Yang -- col. 2, lines 46-47.) As shown in FIG. 2B of Yang, the nitride

remaining on the surface on the wafer is clearly less than one half a height of adjacent gate structures. In addition, Wang does not teach or suggest any thickness of a second portion of a dielectric layer. As such, the cited art does not teach or suggest all limitations of claim 17.

For at least the aforementioned reasons, claims 1 and 17, as well as claims dependent therefrom, are not anticipated by the cited art. Accordingly, removal of the § 102 rejections of claims 1-8 and 10-20 is respectfully requested.

<u>Section 103 Rejections:</u>

Claims 6-10, 12-13, 14, 18, and 19 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Flanner, Tsai, Nulty, Yang, DeBoer, Chen, or Wang. Claim 21 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Chen or Chen in view of DeBoer. As set forth in more detail below, the rejections of claims 6-10, 12-13, 14, 18, 19 and 21 are respectfully traversed.

To establish a *prima facie* obviousness of a claimed invention, all claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974), MPEP 2143.03. Obviousness cannot be established by combining or modifying the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion or incentive to do so. *In re Bond*, 910 F. 2d 81, 834, 15 USPQ2d 1566, 1568 (Fed. Cir. 1990). The cited art does not teach or suggest all limitations of the currently pending claims, some distinctive limitations of which are set forth in more detail below.

None of the cited art teaches or suggests etching a first portion of a dielectric layer with a first etch chemistry that is substantially free of hydrogen and includes C_4F_8, as recited in claim 1. In addition, none of the cited art teaches or suggests etching a first portion of a dielectric layer with a first etch chemistry that is substantially free of hydrogen and etching a second portion of the dielectric layer which has a thickness greater than about one half a height of gate structures, as recited in claim 17. As set forth in more detail above, Flanner, Tsai, Nulty, Yang, DeBoer, Chen, and Wang do not teach or suggest all limitations of claims 1 and 17. Claim 21 recites a similar limitation. Therefore, the cited art does not teach or suggest all

limitations of claim 21. Since none of the cited art teaches or suggests the above limitations of claims 1, 17, and 21, there is no motivation within the cited art to teach such a limitation. As such, the cited art cannot be combined to teach or suggest the limitations of the presently claimed case.

If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984), MPEP 2143.01. A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984), MPEP 2141.02.

The Office Action states:

> With respect to claims 6-10, etchants comprising substantially free of hydrogen, C4F8 & CO, hydrogen-containing compounds, C2H2F4 and CHF3 are conventional etchants for etching the dielectric layer. The selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in Sinclair & Carroll, Co., Inc. v. Interchemical Corp., 325 U.S. 327, 65 USPQ 297 (1945). (Office Action -- page 9).

In contrast, the cited art teaches that modifying the prior art inventions, as suggested by the Office Action, would render the prior art inventions being modified unsatisfactory for their intended purpose. In fact, the cited art appears to "teach away" from the claimed invention.

Flanner, for example, cannot be modified, as proposed by the Office Action. In addition, Flanner appears to teach away from the claimed invention. For example, Flanner states that "both etching steps are performed using the CHF_3/C_2HF_5 chemistry. In the second etch step wherein the oxide to nitride selectivity is preferably increased, CF_4 and/or C_2F_6 may be added to the etchant source gas in one embodiment." (Flanner -- col. 5, lines 38-42.) Flanner also states that "a higher oxide-to-nitride selectivity may cause a spiked etch if employed in the first etching step." (Flanner -- col. 6, lines 29-30.) Therefore, Flanner discloses that using fluorocarbon compounds to etch a first portion of a dielectric layer may increase the oxide to nitride selectivity thereby resulting in a spiked etch. In addition, Flanner states:

> In the first etch step, the contact opening is preferably etched with a first set of process parameters that is designed to, among others, prevent the occurrence of a spiked etch. As the term is employed herein, a spiked etch represents a distortion in the etch sidewall such that the contact opening become progressively narrower at the bottom of the etch. (Flanner -- col. 3, lines 57-63.)

Therefore, modifying Flanner, as suggested by the Office Action, would render the prior art invention being modified unsatisfactory for its intended purpose. As such, there is no suggestion or motivation to make the modification to Flanner proposed in the Office Action.

In addition, Wang appears to teach away from the claimed invention. For example, Wang states:

> Some of the prior art recipes use C_4F_8 in an HDP etch reactor to achieve high selectivity. However, the process window for these processes have been observed to be in the neighborhood of ± 1 sccm. Obviously, such a process is difficult to control in a commercial environment. In more general terms, the low resolution of the mass flow controllers argues against any process using only a few sccm of any gas. (Wang -- col. 5, lines 60-67.)

In addition, Wang states that "gases with large monomers, such as C_4F_8, are very easy to polymerize, perhaps too easy. The control of polymerization rate using C_4F_8 as the polymer former often challenges the limit of hardware controllability. As a result, the selectivity is obtained only in a narrow window of process parameters." (Wang -- col. 7, lines 8-13.) Therefore, Wang teaches away from the claimed invention.

Furthermore, Wang cannot be modified, as proposed by the Office Action. For example, Wang states that "it is desired to provide a process for oxide etching that has a wide process window." (Wang -- col. 6, lines 1-2.) Wang also states that "[t]his invention relies upon the belief that the gas composition and polymer formation can be chosen and controlled for a wide process window and optimized selectivity and characteristics window in oxide etching." (Wang -- col. 6, lines 40-43.) As set forth in more detail above, Wang teaches that C_4F_8 will reduce the process window for an etch process. Therefore, modifying Wang, as proposed by the Office Action, would render the prior art invention being modified unsatisfactory for its intended

purpose. As such, there is no suggestion or motivation to modify Wang as proposed in the Office Action.

Additionally, Nulty cannot be modified as suggested by the Office Action. For example, Nulty states that "[i]n the present invention . . . improved oxide:nitride selectivity is achieved." (Nulty -- col. 4, lines 31-33.) Nulty also states that "Freon 134a is used as an additive to the etchant gas allowing for improved oxide:nitride selectivity." (Nulty -- col. 4, lines 54-55.) As set forth above in the response to the § 102 rejections, Freon 134a has the formula $C_2H_2F_4$. Therefore, modifying Nulty, as proposed by the Office Action, would render the prior art invention being modified unsatisfactory for its intended purpose. Consequently, there is no suggestion or motivation to make the modification to Nulty proposed in the Office Action.

Chen also cannot be modified as suggested by the Office Action. For example, Chen states that "oxide/nitride etch rate selectivity . . . is raised by the addition of CH_2F_2. The increase in selectivity is attributed to polymer deposition over the nitride. The selection of the additive gas such as CH_2F_2 is made according to a rule where the number of hydrogen atoms must be equal to or greater than the number of fluorine atoms." (Chen -- col. 2, lines 61-65.) As set forth in more detail above in response to the § 102 rejections, Chen discloses a first etch process that uses an etchant gas mixture including C_4F_8 and CH_3F. Therefore, CH_3F is used to increase the selectivity of the polymer deposition over the nitride according to the rule described by Chen. In addition, Chen states that "[i]t is another object of this invention to provide an effective recipe for reactive ion etching of openings in insulative layers utilizing initial high etch rate selectivities." (Chen -- col. 3, lines 50-52.) Furthermore, Chen states that "[t]he objects are accomplished by . . . controlling the rate of polymer formation. The procedure provides a first period during which a high etch rate selectivity of oxide to nitride is achieved by condition which cause heavy formation of polymer." (Chen -- col. 3, lines 60-65.) As such, the objects of Chen are accomplished by a first etch process that uses an etchant gas mixture including CH_3F. Therefore, modifying Chen, as proposed by the Office Action, would render the prior art invention being modified unsatisfactory for its intended purpose. Consequently, there is no suggestion or motivation to make the modification to Chen proposed in the Office Action.

The fact that a claimed species or subgenus is encompassed by a prior art genus is not sufficient by itself to establish a prima facie case of obviousness. *In re Baird*, 16 F.3d 380, 382, 29 USPQ2s 1550, 1552 (Fed. Cir. 1994). MPEP 2144.08.

As set forth in more detail above, DeBoer lists a number of fluorocarbon and hydrofluorocarbons gases that may be used for dry etching. The prior art genus disclosed by DeBoer, however, is not sufficient by itself to establish a prima facie case of obviousness. For example, DeBoer does not disclose criteria for selecting a compound from those listed above.

Consider any teachings of a "typical," preferred," or optimum" species or subgenus within the disclosed genus. If such a species or subgenus is structurally similar to that claimed, its disclosure may motivate one of ordinary skill in the art to choose the claimed species or subgenus from the genus, based on the reasonable expectation that structurally similar species usually have similar properties. See, e.g., *Dillon*, 919 F.2d at 693, 696, 16 USPQ2d at 1901, 1904. MPEP 2144.08.

As set forth in more detail above, Wang discloses that a fluorocarbon such as C_3F_8 provides effective oxide etching, but that a fluorocarbon such as C_4F_8 is too easy to polymerize thereby limiting hardware controllability and resulting in a narrow window of process parameters. Therefore, Wang discloses that these structurally similar species will have substantially different properties. As such, Wang motivates one of ordinary skill in the art to <u>not</u> choose the claimed species or subgenus from the genus disclosed by DeBoer.

If the technology is unpredictable, it is less likely that structurally similar species will render a claimed species obvious because it may not be reasonable to infer that they would share similar properties. See, e.g., *In re May*, 574 F.2d 1082, 1094, 197 USPQ 601, 611 (CCPA 1978). MPEP 2144.08.

Nulty, for example, states:

> It is extremely difficult to design an oxide etch which meets all necessary goals. Additionally, it will be appreciated that while the general effects of certain process conditions are known, and the existence of certain tradeoffs can be predicted, it is far from a straightforward manner to precisely tailor an etch or precisely predict the effects changes in the parameters will have. (Nulty -- col. 3, lines 24-31.)

Therefore, Nulty describes the unpredictable nature of etching technology. As such, Nulty, like Wang, discloses that it is less likely that structurally similar species may not share similar properties. Consequently, even if the cited art discloses structurally similar species, such disclosure will not render a claimed species obvious.

The mere fact that references <u>can</u> be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). MPEP 2143.01.

Even if the cited art can be modified, as suggested by the Office Action, the resultant modifications are not obvious because the prior art does not suggest the desirability of the modification. Flanner, Tsai, Yang, Nulty, DeBoer, Wang, and Chen, alone or in combination, do not suggest the desirability of the modification proposed in the Office Action. As such, the modification proposed by the Office Action is not obvious.

For at least the reasons stated above, none of the cited art teaches or suggests the limitations of claims 1, 17, and 21. Therefore, claims 1, 17, and 21, and claims dependent therefrom, are patentably distinct over the cited art. Accordingly, removal of the § 103(a) rejections of claims 6-10, 12-13, 14, 18, 19 and 21 is respectfully requested.

<u>Patentability of the Added Claims:</u>

The present amendment adds claims 22-26 and 27, which are dependent from claims 17 and 21, respectively, and are patentably distinct over the cited art for at least the same reasons as set forth above. Accordingly, allowance of claims 22-27 is respectfully requested.

CONCLUSION

In this response, claim 6 has been canceled, claims 1, 5, 7, 11-13, 17, and 19-20 have been amended, and claims 22-27 have been added. Rejections of claims 1-21 have been addressed. Moreover, the prior art made of record and not relied upon is not considered pertinent to the presently claimed case. Therefore, this response constitutes a complete response to all of the issues raised in the Office Action mailed September 26, 2001. In view of the remarks traversing the rejections, Applicants assert that pending claims 1-5 and 7-27 are in condition for allowance. If the Examiner has any questions, comments, or suggestions, the undersigned attorney earnestly requests a telephone conference.

The Commissioner is authorized to charge any required fees or credit any overpayment to Conley, Rose & Tayon, P.C. Deposit Account No. 50-1505/5298-04100.

Respectfully submitted,

Kevin L. Daffer
Reg. No. 34,146
Attorney for Applicants

Conley, Rose & Tayon, P.C.
P.O. Box 398
Austin, TX 78767-0398
Ph: (512) 476-1400
Date: December 21, 2001
AMM

ATTACHMENT A
Pending Claims including "Marked-Up" Amendments

IN THE CLAIMS:

Please cancel claim 6 without prejudice or disclaimer as to the subject matter recited therein. Please amend claims 1, 5, 7, 11-13, 17, and 21 as follows:

1. (Amended) A method for forming a semiconductor device, comprising:

etching a first portion of a dielectric layer formed on a semiconductor topography with a first etch chemistry, wherein the first etch chemistry is substantially free of hydrogen and comprises C_4F_8; and

etching a second portion of the dielectric layer with a second etch chemistry different from the first etch chemistry.

2. The method of claim 1, wherein the dielectric layer is substantially continuous.

3. The method of claim 1, wherein an interface does not exist between the first and second portions of the dielectric layer.

4. The method of claim 1, wherein a thickness of the first portion of the dielectric layer is greater than a thickness of the second portion of the dielectric layer.

5. (Amended) The method of claim 1, wherein a thickness of the second portion of the dielectric layer is greater than approximately one half of a height of [an adjacent] a gate structure formed adjacent to the second portion.

7. (Amended) The method of claim 1, wherein the first etch chemistry further comprises [C_4F_8 and] CO.

8. The method of claim 1, wherein the second etch chemistry comprises at least one hydrogen-containing compound.

9. The method of claim 1, wherein the second etch chemistry comprises $C_2H_2F_4$.

10. The method of claim 1, wherein the second etch chemistry comprises CHF_3.

11. (Amended) The method of claim 1, further comprising forming said dielectric layer <u>on said semiconductor topography</u> in one processing step.

12. (Amended) The method of claim 1, wherein the first etch chemistry has a dielectric [layer] material:silicon nitride selectivity of at least approximately 10:1<u>, and wherein the dielectric layer comprises the dielectric material</u>.

13. (Amended) The method of claim 1, wherein the second etch chemistry has a dielectric [layer] material:silicon oxide selectivity of at least approximately 5:1<u>, and wherein the dielectric layer comprises the dielectric material</u>.

14. The method of claim 1, wherein the dielectric layer comprises a doped silicon oxide having a phosphorus concentration of less than approximately 6 wt. %.

15. The method of claim 1, wherein the dielectric layer is in contact with a sidewall spacer of a gate structure and a semiconductor layer comprising isolation regions.

16. The method of claim 15, wherein etching the first portion of the dielectric layer exposes an upper corner of the sidewall spacer, and wherein etching the second portion of the dielectric layer exposes the semiconductor layer.

17. (Amended) A method for forming a contact hole, comprising:

depositing a dielectric layer upon first and second gate laterally spaced gate structures on a semiconductor layer comprising isolation regions;

etching a first portion of the dielectric layer with a first etch chemistry, wherein the first etch chemistry is substantially free of hydrogen; and

etching a second portion of the dielectric layer with a second etch chemistry, wherein a thickness of the second portion of the dielectric layer is greater than approximately one half of a height of the first and second gate structures.

18. The method of claim 17, wherein the first etch chemistry is selective to silicon nitride, and wherein the second etch chemistry is selective to silicon dioxide.

19. (Amended) The method of claim [16] 17, wherein the dielectric layer comprises a doped silicon oxide having a phosphorus concentration of less than approximately 6 wt.%.

20. (Amended) The method of claim [16] 17, wherein etching the first portion of the dielectric layer exposes upper corners of the first and second gate structures, and wherein etching the second portion of the dielectric layer exposes the semiconductor layer.

21. A method for forming a self aligned contact hole, comprising:

etching a first portion of a substantially continuous dielectric layer adjacent to a gate structure with a first etch chemistry substantially free of hydrogen sufficiently to expose a sidewall spacer of said gate structure; and

etching a second portion of the substantially continuous dielectric layer with a second etch chemistry comprising a hydrofluorocarbon etchant sufficiently to expose a substrate under said substantially continuous dielectric layer.

Please add the following claims:

22. (Added) The method of claim 17, wherein the dielectric layer is substantially continuous.

23. (Added) The method of claim 17, wherein the second etch chemistry comprises $C_2H_2F_4$.

24. (Added) The method of claim 17, wherein the dielectric layer is in contact with a sidewall spacer of the first and second gate structures and the semiconductor layer.

25. (Added) The method of claim 17, wherein the first etch chemistry has a dielectric material:silicon nitride selectivity of at least approximately 10:1, and wherein the dielectric layer comprises the dielectric material.

26. (Added) The method of claim 17, wherein the second etch chemistry has a dielectric material:silicon oxide selectivity of at least approximately 5:1, and wherein the dielectric layer comprises the dielectric material.

27. (Added) The method of claim 21, wherein the substrate under said substantially continuous dielectric layer comprises isolation regions, and wherein the isolation regions comprise undoped SiO_2.